DOW CORNING

A Selection Guide to ELECTRONIC MATERIALS

from

Dow Corning

PRODUCTS - PROPERTIES - APPLICATIONS

Summit Distributors, Inc.

916 Main Street Buffalo, N. Y. 14202

Phone: 716-884-3450

Selection

COATINGS

Dow Corning® and Sylgard® brand insulating varnishes and coatings types:

	PROPERTIES	UNITS	Test Method ASTM No.	Dow Corning 997	Dow Corning 630	Sylgard 1377
PHYSICAL AND CHEMICAL	Physical Nature (as cured)			Film	Film	Film
	Color			Brown	Clear	Lt. Straw
	Viscosity 25 C	centiposes	D 445	150	500	100
	Specific Gravity 25 C		D 792	1.01	0.916	1.12
	Shelf Life	months		12	12	12
	Pot Life 25 C (1)	hours		dna	dna	dna
	Cure Time/Temp.	hrs/°C		6/150	2/25	6/150
	Refractive Index 25 C		D 1218	dna	1.4172	dna
	Radiation Resistance (2)	megarads		1000	250	1000
	Flash Point (open cup)	°F	D 92	90	86	105
	H_2O Absorption—7 days	% at 25 C	D 570	0.40	0.10	0.15
	Viscosity/Temp. Coefficient			dna	dna	dna
	Temp./Range—useful	°C		—34 to 315	—60 to 135	—34 to 260
	Thermal Conductivity	$cal/cm^2/°C/sec/cm$		3.5×10^{-4}	3.6×10^{-4}	3.5×10^{-4}
	Thermal Shock MIL-I-16923C	10 cycles		dna	dna	dna
	Weight Loss 96 hr/200 C	%		6.4	5.7	12.0
	1000 hr/200 C	%		9.7	10.5	23.0
	Self Extinguishing		D 635	NO	NO	NO
	Volume Expansion	cc/cc/°C		7.0×10^{-4}	8.0×10^{-4}	5.9×10^{-4}
	Specific Heat 25 C	cal/gm/°C		0.34	0.33	0.34
MECHANICAL	Tensile Strength	psi	D 412			
	Elongation	%	D 412			
	Hardness Shore A		D 676	dna	dna	dna
	Pour/Brittle Point	°C	D 97/D 746	—20	—60	—40
	Deep Section Cure			dna	dna	dna
	Bleed (MIL-I-8660)	%		dna	dna	dna
	Consistency, unworked		D 217	dna	dna	dna
	Evaporation	%		dna	dna	dna
ELECTRICAL	Arc Resistance	seconds	D 495	200	180	120
	Dielectric Constant (10^2 cps)		D 924/D 150	3.1	2.8	3.4
	Dielectric Constant (10^6 cps)		D 924/D 150	3.0	2.7	3.3
	Dissipation Factor (10^2 cps)		D 924/D 150	0.01	0.002	0.005
	Dissipation Factor (10^6 cps)		D 924/D 150	0.007	0.001	0.002
	Electric Strength	volts/mil	D 877/D 149	2000	1400	2000
	Volume Resistivity	ohm-cm	D 1169/D 257	2.0×10^{14}	6.0×10^{14}	1.0×10^{15}
	MIL SPEC.			MIL-I-2707B		

NOTES + Also available in viscosities of 10, 50, 100, 200, 350, 500 and 1,000 centistokes

++ Also available in viscosities of 1,000 and 10,000 centistokes

dna Does not apply

* Viscosities of these fluids in centistokes

** Closed cup

Guide To Electronic M

POTTING AND ENCAPSULATING MATERIALS

Silastic® brand RTV adhesive type:	Dow Corning® RTV encapsulants types:						Sylgard® brand resin types:			
732	3110	3114	3116	3117	3118	3120	182	183	184	185
Rubber	Rubber	Rubber	Rubber	Rubber	Rubber	Rubber	Rubber-like	Rubber-like	Rubber-like	Rubber-li
White	White***	Buff	Tan	Tan	Buff	Red	Clear	Black	Clear	Black
700,000	12,500	12,000	50,000	50,000	30,000	30,000	5,250	8,000	5,250	8,000
1.07	1.1	1.42	1.13	1.13	1.29	1.47	1.05	1.23	1.05	1.23
6	12	6	12	12	6	12	12	12	6	6
1	3.0	4	3	10 min.	1.5	3	8	4	2	2
24/25	24/25	24/25	24/25	12/25	24/25	24/25	4/65	4/65	24/25	24/25
dna	dna	dna	dna	dna	dna	dna	1.43	dna	1.43	dna
100	100	100	100	100	100	100	200	250	200	250
dna	dna	dna	dna	dna	dna	dna	dna	dna	dna	dna
0.40	0.4	0.3	0.4	0.4	0.3	0.2	0.10	0.12	0.10	0.12
dna	dna	dna	dna	dna	dna	dna	dna	dna	dna	dna
—73 to 260	—65 to 250	—65 to 250	—65 to 250	—65 to 250	—65 to 250	—65 to 300	—65 to 200	—65 to 250	—65 to 200	—65 to 2
4.95×10^{-4}	5.0×10^{-4}	5.7×10^{-4}	5.2×10^{-4}	5.2×10^{-4}	5.2×10^{-4}	7.5×10^{-4}	3.5×10^{-4}	7.5×10^{-4}	3.5×10^{-4}	7.5×10
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
6.4	6	6	6.3	6.3	2.0	5.7	2.1	1.5	2.1	1.5
							3.2	2.3	4.0	2.8
NO							YES	YES	YES	YES
9.3×10^{-4}	7.5×10^{-4}	7.5×10^{-4}	7.5×10^{-4}	7.5×10^{-4}	7.8×10^{-4}	5.2×10^{-4}	9.6×10^{-4}	7.8×10^{-4}	9.6×10^{-4}	7.8×1
0.35	0.35	0.34	0.34	0.34	0.35	0.32	0.34	0.32	0.34	0.32
200	350	400	300	300	300	650	900	900	900	900
250	150	140	160	160	150	100	100	100	100	100
25	45	40	35	43	42	65	40	45	40	45
—73							—70	—65	—70	—65
NO	YES	NO	NO	NO	YES	YES	YES	YES	YES	YES
dna	dna	dna	dna	dna	dna	dna	dna	dna	dna	dna
dna	dna	dna	dna	dna	dna	dna	dna	dna	dna	dna
dna	dna	dna	dna	dna	dna	dna	dna	dna	dna	dna
50	90	120	90	90	120	125	115	130	115	130
3.0	3.00	3.60	3.00	3.00	3.50	3.8	2.75	3.05	2.75	3.05
2.9	2.9	3.45	2.9	2.9	3.3	3.7	2.60	2.75	2.60	2.75
0.015	0.015	0.020	0.015	0.015	0.020	0.050	0.001	0.007	0.001	0.007
0.005	0.005	0.008	0.005	0.005	0.003	0.003	0.001	0.01	0.001	0.01
500	600	560	600	550	525	550	550	550	550	550
1.0×10^{13}	1×10^{14}	3×10^{14}	1×10^{14}	1×10^{14}	3×10^{14}	5×10^{13}	2.0×10^{15}	1.0×10^{14}	2.0×10^{15}	1.0×1

(1) Pot life is defined as time required to double viscosity after catalyst has been added.

(2) Useful after exposure to this megarad dose

All values are typical of production materials and are not intended for use in preparing specifications.

***Can be pigmented for color coding

ELECTRONIC PR

aterials

COOLANTS

Dow Corning® fluid type:

COMPOUNDS

Dow Corning® compounds and lubricants types:

200	3	4	340	med. 33	PROPERTIES	
	Compounds			Grease		
Fluid	Grease	Grease	Grease	Grease	Physical Nature	PHYSICAL AND CHEMICAL
Clear	Trans.	Trans.	White	Gray	Color	
20**	dna	dna	dna	dna	Viscosity	
0.955	1.0	1.0	2.45	.972	Specific Gravity	
12	12	12	12	12	Shelf Life	
dna	dna	dna	dna	dna	Pot Life	
dna	dna	dna	dna	dna	Cure Time/Temp.	
1.40	1.406	1.406	dna	dna	Refractive Index	
190	15	20	65	300	Radiation Resistance	
450	dna	dna	dna	dna	Flash Point	
dna	0.30	0.30	0.20	0.20	H_2O Absorption	
0.59	dna	dna	dna	dna	Viscosity/Temp. Coefficient	
—60 to 232	—40 to 200	—57 to 200	—65 to 200	—73 to 175	Temp. Range—useful	
3.4×10^{-4}	5.0×10^{-4}	5.0×10^{-4}	10.0×10^{-4}	2.8×10^{-4}	Thermal Conductivity	
dna	dna	dna	dna	dna	Thermal Shock	
dna	1.0	1.0	1.0	1.0	Weight Loss 96 hr/200 C	
dna					1000 hr/200 C	
dna	YES	YES	YES	YES	Self Extinguishing	
10.7×10^{-4}	9.5×10^{-4}	9.5×10^{-4}	7.5×10^{-4}	8.0×10^{-4}	Volume Expansion	
0.412	0.34	0.34	0.25	0.31	Specific Heat	
dna	dna	dna	dna	dna	Tensile Strength	MECHANICAL
dna	dna	dna	dna	dna	Elongation	
dna	dna	dna	dna	dna	Hardness Shore A	
—60	—75	—80	—75	—73	Pour/Brittle Point	
dna	dna	dna	dna	dna	Deep Section Cure	
dna	3.0	4.0	0.4	2.0	Bleed	
dna	200	200	290	260	Consistency	
dna	1.5	1.5	0.5	1.5	Evaporation	
dna	140	166	120	dna	Arc Resistance	ELECTRICAL
2.68	2.85	2.85	4.9	dna	Dielectric Constant (10^2 cps)	
2.68	2.85	2.85	4.9	dna	Dielectric Constant (10^6 cps)	
0.00004	0.0006	0.0006	0.005	dna	Dissipation Factor (10^2 cps)	
0.00001	0.0006	0.0006	0.001	dna	Dissipation Factor (10^6 cps)	
350	500	500	450	dna	Electric Strength	
1.0×10^{14}	1.0×10^{14}	1.0×10^{14}	2.0×10^{15}	dna	Volume Resistivity	
MIL-S-21568A		MIL-I-8660A		OS-10509	MIL SPEC.	

Dow Corning Electronic Materials

Dow Corning manufactures a complete line of dielectric materials for the electronic industry. Among these products is a wide range of silicone fluids, resins, varnishes, compounds, elastomers, molding compounds and laminating resins.

HEAT SHRINKABLE RUBBER

Parts and tubing of heat shrinkable silicone rubber are among the newest dielectric products available from Dow Corning. Used for cable coverings, connector boots and cable splicing, heat shrinkable rubber parts exhibit high heat resistance and good ablative properties.

MOLDING COMPOUNDS

Dow Corning manufacturers transfer molding compounds for the fabrication of molded parts and the encapsulation of resistors, capacitors, diodes, transistors, modules and other electronic components. Silicone molding compounds exhibit excellent properties over a temperature range of —65 to 300 C. The low dielectric losses exhibited by these materials result in extended operating frequency ranges for high frequency devices.

SILICONE LAMINATES

Glass laminates bonded with Dow Corning silicone resins are available through leading custom fabricators and distributors. These silicone glass laminates are used for circuit boards, coil forms, protective tubing and mechanical parts requiring high heat resistance and good high frequency dielectric performance.

SILICONE FLUIDS

DOW CORNING® 331 Fluid is a dielectric coolant for airborne electronic systems and other electronic devices. It is designed to meet MIL-S-27875.

DOW CORNING FS-1265 Fluid is a flurosilicone fluid with lubrication properties comparable to many organic lubricants . . . has been found especially useful for gyro floatation.

DOW CORNING Diffusion Pump Fluids types 702, 704 and 705 are specially formulated silicone fluids designed to produce ultrahigh vacuum. These fluids are stable, clear and exhibit low vapor pressures. Pressures of 5×10^{-11} torr, or lower, are attainable when refrigerated baffles are used in conjunction with Dow Corning 705 fluid. Applications for Dow Corning fluid types 702 and 704 include vacuum deposition of films in thin film electronic circuitry and production of thermionic and cold cathode vacuum tubes.

PROTECTIVE COATINGS

DOW CORNING 145 (red) ***and 630*** (clear) ***Protective Coatings*** are water repellent, flexible, wax-like films that air dry after application by brush, dip or spray. Use for printed circuit boards, coils, circuit modules.

DOW CORNING

DOW CORNING ELECTRONIC MATERIALS AVAILABLE FROM AUTHORIZED DISTRIBUTORS

SILICONE FLUIDS

DOW CORNING® 200 Electronic Fluid is available from authorized distributors in viscosities of 10, 20, 50, 100, 200, 350, 500 and 1,000 centistokes. This fluid, designed to meet MIL-S-21568A, is tested in accordance with Dow Corning quality control specifications for electronic grade fluids.

SILASTIC® Brand RTV Rubber

SILASTIC 732 RTV Rubber is ready to use as squeezed from a tube or cartridge. This adhesive/sealant bonds metals, plastics or silicone rubber; seals connectors, repairs cables, fills voids and can be used to encapsulate small electronic components.

DOW CORNING® Brand RTV Encapsulants

Six different encapsulants have been developed to provide selection of the product best suited for your application or processing requirements. They are:

1. ***DOW CORNING 3110 RTV Encapsulant*** is a *low* viscosity *deep section* curing compound that can be color coded.
2. ***DOW CORNING 3114 RTV Encapsulant*** is a *low* viscosity *general purpose* compound.
3. ***DOW CORNING 3116 RTV Encapsulant*** is a *medium* viscosity *general purpose* compound.
4. ***DOW CORNING 3117 RTV Encapsulant*** is a *medium* viscosity *fast curing* (10 minutes) compound.
5. ***DOW CORNING 3118 RTV Encapsulant*** is a *medium* viscosity deep section curing *reversion resistant* compound.
6. ***DOW CORNING 3120 RTV Encapsulant*** is a *medium* viscosity *deep section* curing, *high* strength (650 psi tensile) compound.

SLYGARD® Brand SOLVENTLESS SILICONE RESINS

SYLGARD 182 Resin is a transparent silicone resin for potting, encapsulating and coating electronic circuits and components. Long pot life and low viscosity make this elevated temperature curing material ideal for use in production dispensing equipment.

SYLGARD 183 Resin, companion product to Sylgard 182 resin, is an opaque material with better heat conduction and a wider serviceable temperature range.

SYLGARD 184 Resin, a transparent room temperature curing resin, is designed for the potting and encapsulation of heat sensitive devices and circuits.

SYLGARD 185 Resin, opaque version of Sylgard 184 resin, is used where opacity is an asset and higher heat conductance is required.

SILICONE COMPOUNDS

DOW CORNING 3 Compound is a translucent, grease-like material, designed to reduce corrosion on switch contacts and battery terminals and as an insulator for electronic assemblies.

DOW CORNING 4 Compound, a greaselike sealing and lubricating material for switches, toroids and connectors and a moisture proofer for electronic equipment, is designed to meet MIL-I-8660A.

DOW CORNING 340 Compound is a highly heat conductive, greaselike material used on transistor and rectifier heat sink junctions to improve thermal conduction.

MOLD RELEASES

DOW CORNING 7 Compound, a mold release agent, with the consistency of petroleum jelly, provides easy release of epoxies, polyesters and vinyls.

DOW CORNING 20 Compound is a heat curing mold release agent designed to form a durable thin film for easy release of epoxies, polyurethane foams, silicone laminates and silicone encapsulating resins.

LUBRICANTS

DOW CORNING 33 Grease, in medium and light consistencies, is designed to lubricate ball bearings and instrument bearings over the wide temperature range of —100 F to 350 F. Designed to meet OS-10509.

COATINGS

DOW CORNING 991 Varnish is an air dry varnish for coating and impregnating coils, transformers and electronic circuitry.

DOW CORNING 997 Varnish meets class H insulation requirements. A high temperature material, it is used for impregnating and coating coils, transformers, and other electrical/electronic equipment operating in high heat environments. Designed to meet MIL-I-2707B.

SYLGARD 1377 Varnish, a general purpose varnish with excellent adhesion and moisture resistance, is designed for coating and impregnating coils, transformers and reactors. Meets requirements of A, B, F, and H insulation systems.

Additional information on any or all of these materials is available from the Electronic Products Division, Dow Corning Corporation, Midland, Michigan, 48641.

ELECTRONIC PRODUCTS DIVISION, DOW CORNING CORPORATION, MIDLAND, MICHIGAN 48641

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